

Accessibility for Mathematics and Statistics modules

Introduction

[You can read the M&S Accessibility statement here.](#)

The Open University provides a range of support services for disabled students. You may not think of yourself as disabled but if you have a long term health condition, autism, a specific learning difficulty (such as dyslexia) or a mental health difficulty then you are entitled to support. We use the single term 'disabled' or 'disability' to cover all these conditions. You can find more information about the services that are available by going to the [Supporting students with disabilities](#) website which links through to [Overcoming Barriers to study if you have a disability or health condition](#). For example, you may need to have module materials in an alternative format, extra tutorial support or flexibility with some assignment deadlines because of your disability or condition.

If you live in the UK, you may be able to get a grant called the Disabled Students' Allowance (DSA). This aims to cover the extra costs of studying in higher education – for example, the need for specialist equipment that might arise because of your disability, medical condition or specific learning difficulty. Further information on the DSA is available on the [who provides support and adjustments](#) website, and you can also visit [Disabled student support](#). If you would like to discuss your needs, before registering as a student, please [contact us](#). Any sensitive information will be treated confidentially.

If you are already an Open University student, you can also find more information on the [Disabled student support](#) website. Once you have read this guide, if you think that you will need additional support, you can submit a [Disability Support Form](#) outlining your requirements and then discuss the help that you need with an adviser; if you will need help to complete the form over the phone, please contact us.

You can also obtain advice and information from your [Student Support Team](#).

Please contact us as soon as possible to discuss your requirements, as some support services can take several months to arrange.

This guide outlines some of the general accessibility issues that apply to distance learning of mathematics and statistics. Many of the issues discussed apply to both mathematics and statistics, and you can assume that references to mathematics also apply to statistics. This guide includes advice on:

- using the module materials
- using software that may improve accessibility
- writing mathematics and statistics
- assessment.

The guide does not provide advice on the accessibility of individual modules, or additional or alternative resources that they may provide. This information may be provided in the module description and either on the module website or in the module guide.

General information on the accessibility of the OU's online resources is available in [the accessibility section](#) of The Open University's Computing Guide .

Note that some of the website links in this Accessibility Guide are available only to registered students.

Studying mathematics and statistics

Each mathematics or statistics module involves using a wide range of resources, including some or all of the following:

- module website
- printed units
- scientific calculator
- computer software
- audio, video and tutorial clips (screencasts).

In addition, you will have the opportunity to join in discussions with your tutor and other students, in tutorials and through online forums and email. The tutorials may take place at a study centre or using the University's *Online Rooms* environment, which combine voice, text and images.

By its nature, mathematics is a very visual subject, and most mathematics and statistics modules contain considerable amounts of mathematical notation, graphs and diagrams that you will need to be able to interpret and produce. You may also need to use the computer and mouse to manipulate and enter data. You may need to consider if you are likely to experience problems with activities and assessment questions that involve using your computer, or have high graphical content, particularly if you have difficulties reading print or using a computer for any length of time.

The Open University is committed to making every reasonable effort to make its teaching accessible and to use accessible resources, however some material that is core for a module may not be easily accessible, even if you use assistive technology. You may need a non-medical helper to assist you. If you have any accessibility problems or comments that would help us improve a particular module, please ask your study advisor or tutor to let the module team know. Information about accessibility issues that arise during the life of the module will be posted on the module website.

The module websites

The module websites provide access to a range of resources. These include the Study planner, module resources, any interactive activities and assessment materials. Each website has been checked for accessibility and has an '[Accessibility](#)' link at the top of each page. This provides a link to the OU Accessibility site which has advice on increasing the text size and changing your browser settings, such as colours and fonts. It also includes a link to the accessibility section of the Computing Guide and some useful external links.

The Resources tab may contain a section on Accessibility, which may include figure descriptions of the diagrams and images in the module, and written transcripts of the videos and tutorial clips (screencasts). It may also contain other accessibility resources related to the module. Please refer to the individual module guides for information about this.

Searchable PDF versions of printed material are available in the Resources section of the module website. However, mathematical and statistical content in PDF files is unlikely to be accessible using a screenreader, and older modules may have PDF files that are not searchable. You may need additional help to read these documents.

Modules in mathematics and statistics may require you to spend some or a lot of time online, for example viewing screencasts, completing Interactive Computer Marked Assignments (iCMAs), attending online tutorials or engaging with forums. If you have

any accessibility problems relating to this, please ask your study advisor or tutor to let the module team know.

Printed units

The latest information on [alternative formats for printed units](#) is available from the Services for Disabled Students website.

Text descriptions are provided for all printed diagrams, charts and graphs that require them. In some cases, you may find it helpful to use the PDF file and enlarge the diagram or graph on your computer screen. An audio graphing calculator can also be used for some activities.

There is free software such as MathTrax that can provide an audio version of some graphs and datasets, and can be used alongside a screenreader. This type of software can be useful if you have difficulty reading text, either printed or on screen.

MathTrax can be downloaded free from the [MathTrax homepage](#).

Notes are available on using [MathTrax to plot datasets](#) and [graph equations](#). [Further information on MathTrax](#) is also available.

If the effects of your disability make it difficult for you to produce written mathematics, graphs or diagrams, you may like to consider using [Efofex](#), particularly if you are studying YO33 or MU123. This is available free to disabled students under the EmPower programme. Further details are available on the [EmPower website](#) or by emailing info@efofex.com for further information.

Scientific calculators

You may need a scientific calculator for your module. Any model that meets the module specification can be used, including computer-based calculators, talking calculators and those with large keys and displays. You can request the loan of a talking scientific calculator from the [borrowing small equipment](#) webpage. You can also use the calculator that comes with your computer, if you wish. On the Windows calculator, for example, the menu contains an option to switch the calculator to scientific mode.

You should note that only certain types of calculators are permitted in examinations; further details are available at [Calculators permitted in examinations in mathematics and statistics](#).

Emulators for some types of calculators are available. These enable you to use a calculator on your computer screen and to enlarge the screen and keyboard. An emulator for the Casio fx-82 and Casio fx-85 is available for Windows 7, 8 and 10 from [ClassWiz Emulator Subscription v2.00 \(90 Day Trial\) for Windows](#). This link includes emulators for many calculators, so please check that you have downloaded and installed a version that meets the exam requirements (for example, the fx-82/85/350EX emulator).

Computer resources

All computer resources have been checked carefully for accessibility, and they can be operated using the keyboard as well as the mouse, unless stated otherwise in the module description. Some components also have their own shortcut keys. For some dynamic computer resources, you may wish to consider the services of a non-medical helper, even if you have assistive technology.

A variety of software applications, some specifically for OU modules and some for more general use, are available for students to download from the [Software Downloads](#) section of the Computing Guide.

The Java Access Bridge, which enables Java applications and screenreaders to work together on Windows PCs, is installed as part of the standard Java package; users of assistive technology with Java applications should ensure that the Java Access Bridge is enabled; explicit instructions are given in the [Additional software required](#) section of the Computing Guide.

Audio, video and tutorial clips (screencasts)

All audio, video and tutorial clips (screencasts) have transcripts, subtitles and closed captions or alternative versions, unless stated otherwise in the module guide.

Tutorials

Tutorials may be offered either face-to-face or online using the university's conferencing system, *Online Rooms*. Please discuss your requirements with your Student Support Team or with your tutor, particularly if you are deaf or hard of hearing, or use assistive technology such as a screen reader, or if you need particular colour settings.

Writing mathematics using a computer or laptop

This section is aimed at those of you who either need or wish to use a computer or touchscreen to prepare your assignments. Typesetting mathematics is a time-consuming process, but learning how to do it may be a good investment if you are intending to study a lot of mathematics. The Mathematics and Statistics Study website contains information on [typing mathematical notation](#) by using either Microsoft Word or the mathematical typesetting language LaTeX. A link to this guidance is under the Skills tab.

Typesetting, even of elementary mathematics, can be tricky. For screenreader users, there are specific issues in that although you may be able to type in maths expressions, the screenreader may not be able to read them back to you. The essential reason why typesetting mathematics is difficult is that written mathematics is two-dimensional in nature. Objects like fractions and matrices have a two-dimensional format and are sometimes stored as images rather than text. This is why screenreaders have difficulty. The good news is that technology is improving all the time and there is software that can help you.

If you use a screenreader and intend to study mathematics beyond Level 1, then you are advised to learn how to use LaTeX, a freely available mathematical typesetting package. This system is long established and it is used by professional mathematicians. The mathematical expressions are typed in a straightforward (plain text) way; experienced blind or/and partially sighted people/students users are likely to read mathematics, as well as write it, in this format. There is further information about Braille and LaTeX on the [latex-access sourceforge](#) website.

If you are going to work fully in LaTeX, you might wish to investigate editing software called [EdSharp](#). This text editor has been designed with screenreaders in mind and incorporates facilities for editing LaTeX, HTML and other coding languages.

If you are studying mathematics as part of subject area where Microsoft Word is the normal document software, then you have two main options for entering mathematical content: you may either use Word's inbuilt equation editor, or you may use [MathType](#). If you wish to use Word's inbuilt equation editor, you may like to access this video [on Getting started with effective entry of equations in Word](#). If you obtain version 6.5 or higher of MathType, then you will be able to type in your mathematics using LaTeX notation, but manage the rest of the document in the usual way. You can then toggle between the LaTeX and the maths display by pressing Alt and the backslash key (\)

together from within Microsoft Word. This should help you to check your work. There are some further details on the [access2science Authoring Math](#) website.

If you decide to use MathType for both your assignments and discussions with your tutor, please check that your tutor can see what you have written. If your tutor does not have MathType installed, then they may not be able to see your mathematical statements. One option is to save your document as a PDF file, so that your tutor can read it easily; this is a reliable method and is recommended.

Some assistive technology, such as [ZoomText](#) works best when used with equations produced using Microsoft Word's equation editor. When increasing the font size in the Word document, equations produced in Word format will reflow while those produced with MathType will not.

Some students have found using the commercial software [MathTalk](#) helpful for dictating mathematical statements. However, if you decide to use Mathtalk for any assessments, then you must turn off the computer algebra engine and not use the Evaluate, Solve, Integrate or other similar commands. To turn off the engine in MathTalk, please click on Tools, then Computation Setup and then select None in the 'Current Engine' drop-down box. The YouTube video titled [turning off engine in scientific notebook](#) illustrates how to do this.

Assessment

Assessment in the form of Tutor-Marked Assignments (TMAs) can be submitted by posting a paper copy to your tutor, or electronically submitted using The Open University eTMA system. TMA questions may be in PDF format or accessed directly from the website. In places where graphs or diagrams are used, descriptions will be supplied. You should be able to complete the TMAs successfully with appropriate support from your tutor or helper.

iCMAs are submitted online and may have some interactive content. If you are unable to access the internet (for example, if you are a Student in a Secure environment) or are unable to use the iCMA system for other exceptional reasons, please contact your [Student Support Team](#).

The examinable component for your module may be in the form of an end-of-module assessment (EMA) or an exam. If you have already notified us about a long term health condition, specific learning difficulty or mental health difficulty, you will be contacted

by your [Student Support Team](#) to discuss any requirements that you may have for the exam.

If you are unable to submit all your assignments or have extra difficulties during the EMA or the exam, you are advised to notify the Exam Board to explain your circumstances. You can do this online by filling in a [special circumstances form](#). If you need further help with the assessment on your module, please contact your tutor.

Summary of web links

The [Accessibility section](#) of the Computing Guide has general advice on accessibility for Open University modules, including information on accessibility of equations on module websites. Some external sites also have useful information; for example, [Microsoft accessibility](#) has some useful pages on how to access computers and on [Windows keyboard shortcuts for accessibility](#). Similar information is [available for Apple computers](#).

The list below summarises the main websites mentioned in this guide; you can access the university links from your StudentHome page.

We wish you every success with your study of mathematics and statistics. If you do experience any difficulties during your studies, please contact your tutor, who will be able to help you with the assistance of other OU staff in Study Support and Services for Disabled Students.

Useful web links

Description	Web address
Accessibility section of the Computing Guide	https://learn1.open.ac.uk/course/view.php?id=100132&cmid=12929
Accessibility - using a computer for OU study	https://help.open.ac.uk/accessibility-using-a-computer-for-ou-study
Additional software required section of the Computing Guide	https://learn1.open.ac.uk/mod/oucontent/view.php?id=8329&section=5
Borrowing small equipment	https://help.open.ac.uk/borrowing-small-equipment
Calculators permitted in examinations in mathematics and statistics	https://learn2.open.ac.uk/mod/oucontent/view.php?id=1187836 https://edu.casio.com/softwarelicense/index.php#col2

ClassWiz Emulator Subscription v2.00 (90 Day Trial) for Windows	
Contact us	http://www.openuniversity.edu/contact-us
Disability Support Form	https://help.open.ac.uk/disability-support-form
Disabled student support	http://www2.open.ac.uk/students/help/topic/disability
EdSharp	https://github.com/ EmpowermentZone/ EdSharp
Efofex	http://efofex.com/
Getting started with effective entry of equations in Word	http://www.mathcentre.ac.uk/bathmash/ Word/ index.html
LaTeX – Braille converter	http://latex-access.sourceforge.net
LaTeX in MathType	www.access2science.com/jagqn/ WordLatex.html
Mathematics and statistics	https://learn2.open.ac.uk/site/s-maths
MathTalk	http://www.mathtalk.com
MathTrax	https://prime.jsc.nasa.gov/mathtrax/
MathTrax – drawing graphs	http://prime.jsc.nasa.gov/mathtrax/ SHOWME/ equations.htm
MathTrax – plotting datasets	http://prime.jsc.nasa.gov/mathtrax/ SHOWME/ data.htm
MathType	www.dessci.com/en/ products/ mathtype
Module website accessibility	https://help.open.ac.uk/accessibility-using-a- computer-for-ou-study
Overcoming Barriers to study if you have a disability or health condition	http://www2.open.ac.uk/students/help/ overcoming- barriers-to-study-if-you-have-a-disability-or-health- condition
Software downloads	https://learn1.open.ac.uk/mod/ oucontent/ view.php? id=12658
Special circumstances	www.open.ac.uk/ assessment/ requests/ special- circumstances.php
Student support team	https://help.open.ac.uk/ your-contacts
Supporting students with disabilities	http://www.open.ac.uk/courses/ do-it/ disability
Turning off engine in scientific notebook	https://www.youtube.com/ watch?v=chOPU4QXIFc
Typing Mathematical notation	https://learn2.open.ac.uk/ course/ view.php? id=206217&cmid=1172763
ZoomText	https://www.zoomtext.com/